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Awareness of Secondary School Students Regarding Climate Change in Sohag City

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Abstract

Background: Climate change refers to the long-term changes in global temperatures and other characteristics of the atmosphere. Climate has changed throughout Earth's long history, but this time it's different. Human activity is causing worldwide temperatures to rise higher and faster than any time we know of in the past**. Aim:** was to assess awareness of secondary school students regarding climate change in Sohag city. **Design:** A descriptive research design was used in this study. **Setting:** The current study was conducted at all governmental secondary schools in Sohag City. **Subject:** A convenient sample of 100 students from secondary schools. **Tools:** A structured self-administered questionnaire which included three parts: Socio-demographic characteristics, secondary school students' knowledge about climate change, and secondary school students' attitude toward climate change. **Results:** more than three fifths of the studied students had average total level of knowledge about climate change, and slightly less than one third of the studied students had poor total level of knowledge about climate change. And more than three quarters of the studied students had positive total attitude level toward climate change.**Conclusion:** There is highly statistically positive correlation between total knowledge levels and attitude levels toward climate change. **Recommendations:** Educational program should be performed to secondary school students regarding climate change. Further researches in the field of climate change should be done in other setting and on large sample.

Keywords: *Awareness, Climate Change, and Secondary School Students.*

Introduction

Climate change is a process of changing the climate system over a long period and over a wide area due to natural processes or as a consequence of human activity has become a global issue. Natural processes have a small contribution to climate change, whereas human activity is the most significant contributor ***(Zittis et al., 2022).*** Global climate change is the most troublesome hindrance that the world is currently facing in its struggle for existence. Earth's climatic systems are one of the most dynamic and complex systems which still have not been properly understood. The present climates and their elements are far different from the past, introducing newer complexities within the climatic sciences. It is of no doubt that, climate change is entirely a natural process, the examples of which can be drawn from the ice ages، but the anthropogenic side cannot be ignored. In fact, humans act as moderating factor through their everyday activities which somehow attempt to introduce desired modifications in natural climatic processes. Thus, the concept of Global Warming has evolved ***(Prakash, 2021).***

Climate change refers to primarily driven by human activities like burning fossil fuels, deforestation, and industrial processes. These activities increase greenhouse gas concentrations in the atmosphere, leading to global warming. Effects include rising temperatures, melting glaciers, sea-level rise, extreme weather events, and disruptions to

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ecosystems. Addressing climate change requires reducing greenhouse gas emissions, transitioning to renewable energy, and adopting sustainable practices globally ***(Celik, 2020).***

Schools can play an important role in combating climate change by teaching young people more environmentally friendly habits and creating a generation that supports actions to reduce carbon dioxide pollution. The climate change for sustainable development field aims to enhance and make more visible the contribution of this education to the international response to climate change ***(Tibola et al., 2020).*** Also, climate change have effect on secondary school students physical health include fatalities and injuries; heat-related illnesses; exposure to environmental toxins; infectious, gastrointestinal, malnutrition and parasitic diseases that are more prevalent in warmer temperature ***(Sheehan, 2022).*** Psychological and mental health include significant increases in posttraumatic stress disorder (PTSD), depression and anxiety, sleep problems, cognitive deficits, and learning problems ***(Pala, 2024).***

Secondary students should be familiar with concepts related to climate change, biodiversity and environmental sustainability, infer the relationship between climate change and sustainable development, identify a list of topics related to climate change, biodiversity and environmental sustainability, plan a climate change awareness unit and design school-wide activities to educate students about the effects of climate change, and identify mechanisms for evaluating positive environmental practices in student behavior ***(De Rivas, 2024).***

Secondary student's awareness on climate change must be considered in climate change adaptation in the country and integrated even in the formulation of disaster risk reduction plan. Secondary education is a good starting point for preparing healthy peoples. Mitigation and adaptation strategies in response to climate change can be taught in secondary schools ***(Feldbacher et al., 2024).***

A community health nurse should be aware of climate change and consider it a serious public health issue that requires attention in both research and practice because they are presupposed to play an important role in mitigating the health risks of climate change. In order to minimize detrimental health effects, it is crucial that basic and advanced nursing education incorporate knowledge on climate change ***(Mostacedo-Marasovic et al., 2024).***

Significance of the study:

The World Health Organization (WHO) projects there will be approximately 250.000 deaths annually from climate change worldwide between 2030 and 2050. And estimates that adolescent's will suffer more than 80% of the illnesses, injuries, and deaths attributable to climate change ***(World Health Organization, 2021).*** Egypt is one of the extremely vulnerable countries that face Climate Change (CC) and alternative varied threats to its economic, social, and environmental property together with energy, water, and food security ***(Gopal & Pitts, 2025).*** The Egyptian Meteorological Service published a report that summer 2021 had seen an unprecedented rise in temperatures five years ago, with temperatures rising by an average of 3-4 degrees Celsius above normal. This prompted the Egyptian government to take more serious and effective actions, programs, and policies to adapt to emerging climate changes and to counter its negative impacts on various economic sectors ***(Al ahram center for political & strategic studies, 2021).***

In Egypt, the over population is one of the main causes that make the country extremely at risk to CC. Moreover, its densely inhabited Nile delta is seriously vulnerable by water level rise. Global climate change will also have its impact on citizens' health ***(International Journal of Environmental Studies, 2022).*** Egypt is always keen to develop and strengthen joint regional and international efforts in the fields of environment and climate, not only through participation, but also through the presidency of many conferences, negotiations and committees on environmental and climate issues both inside and outside Africa in coordination with the United Nations. Egypt applied to host the 27th session of the Conference of States Parties to the United Nations Convention on Climate Change (COP 27) in 2022 as a representative of the challenges, efforts and priorities of the African continent in the face of the climate change crisis ***(Enterprise Ventures,2022).*** Secondary school students are the decision-makers of the future, and as educational research shows, behaviors, habits, and attitudes established at young age strongly shape behavior in adulthood ***(Gianfredi et al., 2024).*** Therefore, it is important to assess awareness of secondary school students regarding climate change.

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Aim of the study:

The aim of this study was to assess awareness of secondary school students regarding climate change in Sohag city through:

1- Assessing knowledge of secondary school students regarding climate change.
2- Identifying attitude of secondary school students toward climate change.

Research questions:

1-What is secondary school student's knowledge regarding climate change?
2-What is secondary school student's attitude toward climate change?
3-What is the relation between secondary school students knowledge, attitudes and there socio demographic characteristics?
4-What is the correlation between secondary school students' knowledge and their attitude?

Subject and methods:

The subjects and methods for this study were portrayed under the four main items as follows:

I-Technical item. II- Operational item.
III- Administrative item. IV- Statistical item.

Technical item:

The technical item was included research design, setting, sample and tools for data collection.

Research Design: A descriptive research design was used for carrying out this study.

Settings: The current study was conducted at all governmental secondary schools in Sohag City.

Sampling:

Type of the sample: A convenient sample was used in this study.

Sample size: A convenient sample of 100 students from secondary schools. This sample was collected from two different and separated schools at Sohag city; two classes were selected randomly from each school (one from the first year (50 students) and one from the second year (50 students). Sample size was determined based on ***(Thompson et al., 2020),*** and according to the following formula:

N = required sample size t = confidence level at 95 % (standard value of 1.960).

p = estimated prevalence of secondary students 2020 (0.2). m = margin of error at 5 % (standard value of 0.050).

$$N = \frac{t2 \quad x \quad p\,(1-p)}{m2}$$

Tools for data collection:

Data were collected through using the following one tool.

Tool I: A structured self-administered questionnaire:

A structured self-administered questionnaire which included three parts:

Part I: Socio-demographic characteristics:

This part was developed by the investigator after reviewing the related literature and it was included: School name, age, gender, academic year, father's level of education, mother's level of education, father occupation, mother occupation, family income level, family residence, type of housing, number of family member, number of rooms in the house, crowding index, attendance seminars about climate change and source of information about climate change.

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Part II: Assessment of secondary school students' knowledge about climate change:

It was adapted from **Liarakou et al., (2011**) and was modified by the investigator. It was consisted of 12 questions and included meaning of climate change, causes and the main problem that leads to climate change at present time, the main source of energy that causes environmental pollution, the gas that led to an increase in the hole in the ozone layer, the devices that emit gas that threatens the ozone layer, the elements that are negatively affected by climate change, results from climate change, the dangers of global warming, the impact of climate change on humans, the ways to reduce climate change and the energy sources that have the least impact on climate change.

Knowledge scoring system:

Each knowledge item was given a score (3) for complete correct, (2) for incomplete correct, and (1) for wrong & don't know. The total score of knowledge was ranged from 1- 36 points that calculated and classified as follows:

- Good knowledge if the score was ≥ 75% (≥ 27 points)
- Average knowledge If the score between 50 < 75% (18 < 27 points)
- Poor knowledge if the score < 50% (<18 points)

Part III: Assessment secondary school students' attitude toward climate change:

It was adapted from **Netravathia et al., (2014**) and modified by the investigator. It was consisted of 16 sentences and included: climate change is global phenomenon, climate change leads to shortage in food recourses, climate change is not a reality but just allegations, climate change affects human health, studying climate change is necessary because it affects the environment, climate change leads to an increase in the rate of soil drying, and there is no need to consume existing resources to solve climate change problems.

And climate change has led to an increase in natural disasters, the change in rainfall pattern is mainly due to climate change, failure to respond to climate change may lead to the deterioration of agriculture, we need innovative methods in agriculture and industry due to climate change, climate change is a natural phenomenon that humans have nothing to do with, a greener environment must be promoted to reduce climate change, climate change is caused by development in the industrial field and the resulting pollution, reducing energy use should be mandatory if it reduces climate change and animals and plants will become extinct due to climate change. .

Scoring system of the attitude:

The total score of attitudes was derived from 16 sentences. The scoring of each item was agree (3), neutral (2), and disagree (1). The score of each item was summed up and then converted into a percent score. The total score ranged from 1-48 points that calculated and it was categorized as followed:

- Negative attitude if < 60 % (< 29 points).
- Positive attitude If ≥60% (≥29 points).

Operational item:

The operational item was included preparatory phase, validity and reliability, pilot study and filed work.

Preparatory phase:

It was included reviewing of past, current, national and international related literature and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines to develop tools for data collection.

Validity:

The developed tool was formulated and submitted to five experts in community health nursing to assess the content validity, needed modifications were done.

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Reliability:

Cronbach's Alpha was used to determine the internal reliability of the tool.

Reliability Statistics		
	Cronbach's Alpha	**No. of Items**
Knowledge items	0.751	12
Attitude items	0.791	16

Ethical Considerations:

An official permission to conduct the proposed study was obtained from the Scientific Research Ethical Committee (13 / 2 /2022).Faculty of Nursing, Helwan University. Participation in the study is voluntary and subjects were given complete full information about the study and their role before signing the informed consent. The ethical considerations was included explaining the purpose and nature of the study, stating the possibility to withdraw at any time, confidentiality of the information where it was not be accessed by any other party without taking permission of the participants. Ethics, values, culture and beliefs were respected.

Pilot Study:

The pilot study was done on 10% (20 students) of the secondary school students to examine the clarity of questions and time needed to complete the study tools. Based on the results, no modifications were done. Subjects were included in the pilot study was included because no major modifications required.

Field work*:*

Filed work was included the following:

- An Approval was obtained from the Dean of Faculty of Nursing, Helwan University to directorate of education in Sohag city.
- The investigator was started by introducing herself to each student in the class, giving a clear and brief idea about the aim of the study and its expectations.
- The investigator was available 3days/ week (Sunday, Monday and Thursday) from 9 am to 1 pm to collect data. Each student was interviewed for 20-30 minutes.
- The investigator was collected the data by the previous tools in three months from the beginning of October (2023) until the end of December (2023).
- The investigator was available to explain and answer any students question to clear data for them.

Administrative Item:

Approval to carry out this study was obtained from the Dean of Faculty of Nursing, Helwan University to directorate of education in Sohag city. A letter was issued to them from the faculty of nursing; Helwan University explains the aim of the study for obtaining the permission for data collection.

Statistical item:

The collected data was organized, categorized, coded, tabulated and analyzed using the Statistical Package for Social Sciences (SPSS) version 26. Data was presented in tables and figures using numbers, percentages, means, standard deviation and Pearson test was used in order to find an association between two qualitative variables. Statistical significant was considered at P-value < 0.05.

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Results:

Table (1) Frequency distribution of the studied students according to their sociodemographic characteristics (n=100)

Sociodemographic Characteristics	No	%
Age/ years:		
15	**59**	**59.0**
16	36	36.0
17	5	5.0
Mean ± SD	**15.46±0.59**	
Gender:		
Male	**50**	**50.0**
Female	50	50.0
Academic year:		
The first	**57**	**57.0**
The second	43	43.0
Father's level of education:		
Does not read or write	9	9.0
Reads and writes	3	3.0
Basic education	18	18.0
Secondary school	**33**	**33.0**
University education and above	**37**	**37.0**
Mother's level of education:		
Does not read or write	20	20.0
Reads and writes	8	8.0
Basic education	20	20.0
Secondary school	**25**	**25.0**
University education and above	27	27.0
Father's occupation:		
Worked	**92**	**92.0**
Does not work	8	8.0
Mother's occupation:		
Worked	24	24.0
Housewife	**76**	**76.0**
Type of housing :		
Rented	7	7.0
Owned	**93**	**93.0**
Family residence:		
Rural	**79**	**79.0**
Urban	21	21.0
Number of family member:		
3 individuals	6	6.0
4 individuals	7	7.0
5 individuals	27	27.0
>5 individuals	**60**	**60.0**
Number of rooms in the house:		
Two	15	15.0
Three	**35**	**35.0**
Four	14	14.0
More than four	**36**	**36.0**
Attendance seminars about climate change:		
No	**84**	**84.0**
Yes	16	16.0

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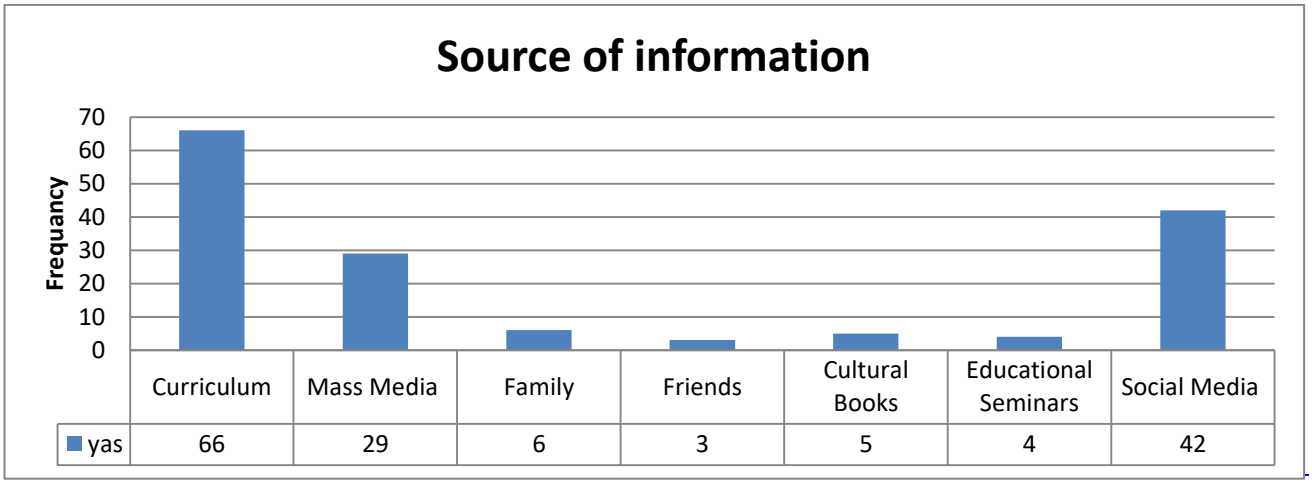

Figure (2) Percentage distribution of the studied students according to their source of information about climate change (n=100)

Table (2): Frequency distribution of the studied students according to their knowledge about climate change (n=100)

Items	Complete correct answer		Incomplete correct answer		Wrong or Don't know	
	No	%	No	%	No	%
Meaning of climate change	**42**	**42.0**	30	30.0	28	28.0
The factors that cause climate change	11	11.0	78	78.0	11	11.0
Main problem leading to climate change at the present time	**32**	**32.0**	58	58.0	10	10.0
The main source of energy that causes environmental pollution	24	24.0	63	63.0	13	13.0
The gas that led to an increase in the hole in the ozone layer	**38**	**38.0**	52	52.0	10	10.0
The devices that emit gas that threatens the ozone layer	**31**	**31.0**	48	48.0	21	21.0
The elements that are negatively affected by climate change	19	19.0	72	72.0	9	9.0
Results from climate change	17	17.0	61	61.0	22	22.0
The dangers of global warming	21	21.0	34	34.0	**45**	**45.0**
The impact of climate change on humans	26	26.0	50	50.0	24	24.0
The ways to reduce climate change	28	28.0	48	48.0	24	24.0
The energy sources that have the least impact on climate change	14	14.0	81	81.0	5	5.0

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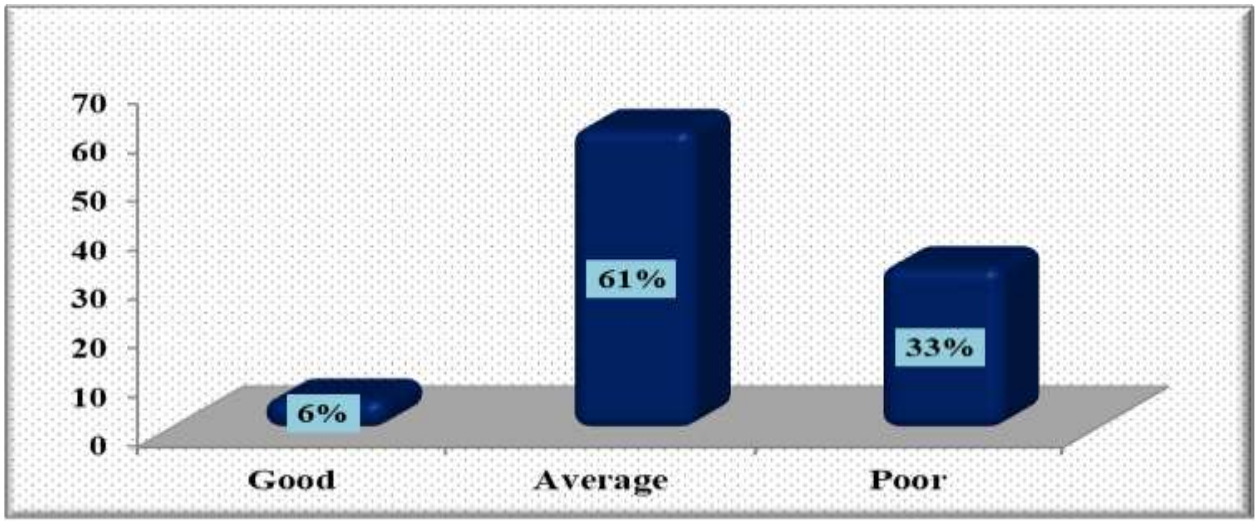

Figure (3) Percentage distribution of the studied students according to total knowledge level about climate change (n=100)

Table (3) Frequency distribution of the studied students according to their attitudes regarding climate change (n=100)

Attitude Items I think that:	Agree		Natural		Disagree	
	No	%	No	%	N0	%
Climate change is a global phenomenon	**90**	**90.0**	6	6.0	4	4.0
Climate change has led to a shortage of food resources	72	72.0	22	22.0	6	6.0
Climate change is not a reality but just allegations	4	4.0	4	4.0	**92**	**92.0**
Climate change affects human health	**88**	**88.0**	4	4.0	8	8.0
Studying climate change is necessary because it affects the environment	**88**	**88.0**	10	10.0	2	2.0
Climate change leads to an increase in the rate of soil drying	55	55.0	38	38.0	7	7.0
There is no need to consume existing resources to solve climate change problems	12	12.0	36	36.0	52	52.0
Climate change has led to an increase in natural disasters	**87**	**87.0**	10	10.0	3	3.0
The change in rainfall pattern is mainly due to climate change	69	69.0	24	24.0	7	7.0
Failure to respond to climate change may lead to the deterioration of agriculture	68	68.0	22	22.0	10	10.0
We need innovative methods in agriculture and industry due to climate change	80	80.0	11	11.0	9	9.0
Climate change is a natural phenomenon that humans have nothing to do with	28	28.0	16	16.0	**56**	**56.0**
A greener environment must be promoted to reduce climate change	67	67.0	26	26.0	7	7.0
Climate change is caused by development in the industrial field and the resulting pollution	75	75.0	11	11.0	14	14.0
Reducing energy use should be mandatory if it reduces climate change	63	63.0	29	29.0	8	8.0
Animals and plants will become extinct due to climate change.	76	76.0	17	17.0	7	7.0

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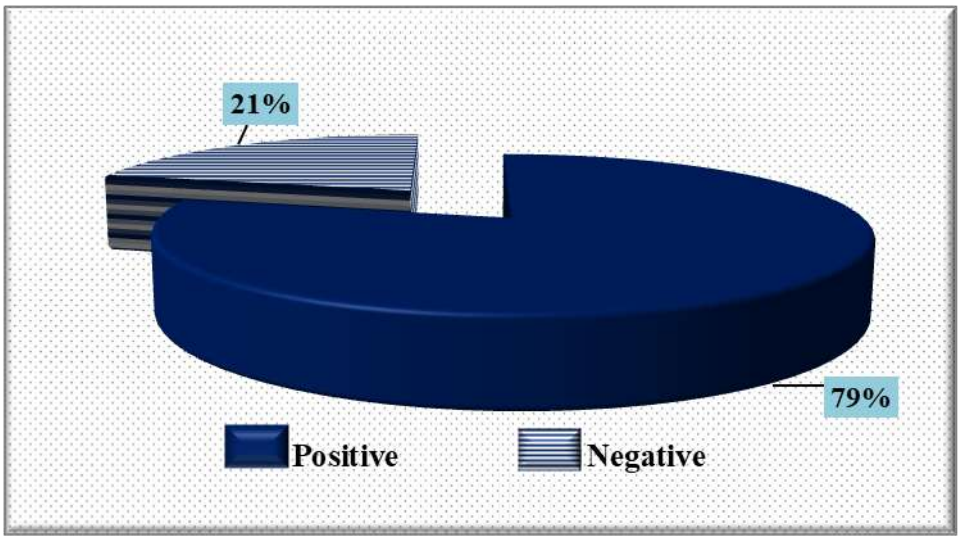

Figure (4) Percentage distribution of the studied students according to total attitude level toward climate change (n=100)

Table (4) Correlation between the studied students' total knowledge and attitude level toward climate change (n=100)

Items		Total knowledge	Total attitude
Total knowledge	r		.494
	P-value		0.001**
Total attitude	r	.494	
	P-value	0.001**	

(*) statistical significant difference (**) highly statistical significant difference

Discussion:

Climate change is impacting human lives and health in a variety of ways. It threatens the essential ingredients of good health (clean air, safe drinking water, nutritious food supply and safe shelter). Risks of climate change to health include air pollution, forced migration, and changing patterns of infectious disease, compromising physical health and mental wellbeing; effects that are more likely to impact on vulnerable populations ***(Aronsson et al., 2020).***

Part (I) Sociodemographic characteristics of the studied students:

Regarding sociodemographic characteristics of the studied students, the current study revealed that more than one half of the studied students had 15 years old with a mean ± SD of 15.46 ± 0.59. **(Table 1)** This finding in the same line with **Calculli et al. (2021)** in Italia (n=1834), who conducted a study entitled "Evaluating people's awareness about climate changes and environmental issues: A case study." and showed that 59.5% of people environmental attitudes and behaviors increased regarding to climate change in adulthood at the age of 10–15years. While, this result in the contrast line with **Abdel Nabi et al. (2023)** in Egypt (n=200), who conducted a study entitled "Assessment of Nursing Students' Awareness regarding Climate Change." and reported that 57% of nursing students aged 21 years. From the investigator point of view, this is because the age group was more prevalent in secondary schools students.

Also, this study results indicated that about one half of studied students were males. The study's findings agreed with **Moselhy et al. (2022)** in Egypt (n= 279), who studied "Carbon Footprint' Knowledge and Calculation among Nursing Students." and reported that 59.50% of the nursing students were males. Despite that, this result contradicted with **Reddy et al. (2022)** in Karimnagar city (n= 903), who studied " the knowledge, perceptions, and practices of medical students towards climate change and global warming" and demonstrated that 64.9% of students were females. From the investigator's perspective, this finding refers to that there is a gradual increase in the number of male nursing students and no longer be an exclusively female profession.

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Concerning academic year, the present study revealed that more than one half of studied students was in the first year. This finding agreed with **Kurup et al., (2021)** in the United Kingdom (n=65), who conducted a study entitled "Informed-decision regarding global warming and climate change among high school students." and reported that about 55.7% of studied students were in the first year in high school students. And this finding not supported by **Elsharkawy et al., (2024)** in Egypt (n= 768), who studied "the knowledge, perception, and practices regarding climate change among students of Al-Azhar University for girls in Cairo, Egypt." and concluded that 29.6% of nursing students were from the first academic year.

As regards parents' educational level, this study revealed that nearly one third of the students' fathers have high school diploma or its equivalent. This study finding consistent with **O'Neill et al. (2020)** in China (n=50), who study entitled "The effect of education on determinants of climate change risks." and reported that regarding parent education, 30 % of the studied parents have secondary school. Also this finding parallels to **Atta et al. (2024)** in Egypt (n= 10,084), who study entitled "Predictors of climate change literacy in the era of global boiling: a cross-sectional survey of Egyptian nursing students." and showed that regarding parental education reveals a diverse background, 49.5% of parents with a Bachelor's degree and more than one third of parents a high school education or less.

The current study revealed that one quarter of the students' mothers have high school diploma or its equivalent. This study finding consistent with **Sciberras & Fernando, (2022)** and reported that 35% level of education among mothers had higher secondary school. This result not supported by **Baker et al. (2021)** in Australia (n=141), who study entitled "Educating for resilience: Parent and teacher perceptions of children's emotional needs in response to climate change." and revealed that more than 60.2% of the studied parents have higher university education level.

With regard to mother occupation, the current study found that more than three quarters of the studied students' mothers were housewives. This finding was agreed with **Khanam et al. (2023)** in Bangladesh (n=3.158), who conducted a study entitled "Experiencing the Impacts of Climate Change-Induced Salinity by Women in Coastal Region of Bangladesh." and reported that 80% of studied women's were housewives. However, this finding disagreed with **Amin et al. (2024)** in Egypt (n=285)who conducted a study entitled "The Association between Emotional Responses to Climate Change, Antenatal Anxiety and Maternal–Fetal Attachment in Primi gravida Women." who revealed that 70% of the studied mothers have profession.

According to family residence, the current study results clarified that more than three quarters of the studied students live in rural areas, while slightly more than one fifth of the studied students lived in urban areas. Students who came from rural areas represented more than two-thirds in the present study. This finding parallels to **Soliman et al. (2023)** in Egypt (n=150), who conducted a study about "the effect of training program about sustainability and climate change on nursing internship students' awareness" and revealed that 59.3% of nursing internship students were living in rural areas. The finding in congruent with **Abdel Nabi et al. (2023)** in Egypt (n=200), who performed a study about "the assessment of nursing students' awareness regarding climate change" and found that 73% of nursing students were living in urban areas. From the investigator point of view, this may be attributed to the nature of Sohag governorate where most people live in rural areas.

According to number of family members, the current study results showed that 60% of the studied students had more than 5 individuals in their family. This study results in same line with **Ge & Lin, (2021)** in China (n=1.9 million), who study entitled "Impact of public support and government's policy on climate change in China." and showed that 48% of the studied family members have five family members. From the investigator point of view that if number of family member is greater can cause over crowded in room and therefore cause climate change.

This study results not in same line with **Kolenatý et al. (2022)** in Czech Republic (n=123), who study entitled "What triggers climate action: The impact of a climate change education program on students' climate literacy and their willingness to act." and reported that 53% of the family students have three family members.

According to their attendance seminars about climate change, this current study result clarified that 84% of the studied students no attend seminars about climate change. This study results agreed with **Ghanem, (2022)** in Egypt (n=393), who study entitled "Assessment knowledge, perception, and behaviors towards climate change among universities youth in Egypt." and showed that 83% of the studied youth do not attendance to seminars for climate change.

This study results disagreed with **Moshou & Drinia, (2023)** in Greece (n=200), who study entitled "Climate Change Education and Preparedness of Future Teachers—A Review: The Case of Greece." and reported that 61% of the studied teachers attended to seminars of climate change.

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According to their family income, the present study results demonstrated that 68% of the studied students have enough income (figure 1). This study finding agreed with **Jalal et al. (2021)** in Bangladesh (n=66), who study entitled that "Does climate change stimulate household vulnerability and income diversity? Evidence from southern coastal region of Bangladesh." and showed that 63% of the studied family have enough household income. Therefore, the households of the study area are suffering from income diversity due to climate change.

In addition, this study result disagreed with **Devonald et al. (2020)** in United Nations (n=9), who study entitled "The first thing that I fear for my future is lack of rain and drought': climate change and its impacts on adolescent capabilities in low-and middle-income countries." and reported that in low income countries, 30% of the studied parents had low income but stable.

According to their source of information about climate change, the current study finding revealed that 66% of studied students gain their information about climate change were from curriculum **(figure 2).** This finding in the same line with **Ryan et al. (2020)** in United States (n=1011), who study entitled "Medical, nursing, and physician assistant student knowledge and attitudes toward climate change, pollution, and resource conservation in health care." and showed that 43% of the studied Medical, nursing, and physician assistant student gained information about climate change from social media and conference.this study results not in the same line with **Atta et al. (2024)** in Egypt (n= 10,084), who reported that 90% of nursing students gained information about climate change from their curricula. From the investigator point of view, these curricula are important source of climate change education.

And this present study results reported that 42% of studied students gain their knowledge about climate change from social media. This finding in the same line with **Ryan et al. (2020)** in United States (n=1011), who showed that 49% of the studied Medical, nursing, and physician assistant student gained knowledge about climate change from social media and conference. Also, this study result agreed with **Mousa et al. (2024)** in Egypt (n=213), who study entitled "Knowledge and practice of nurses toward climate change at Bahariya Oasis" and reported that 51% of the studied nurses gained knowledge about climate change from social media as Facebook, Twitter, and Instagram. This study result disagreed with **Boulianne et al. (2020)** in Canada (n= 993), who study entitled "School strike 4 climate": Social media and the international youth protest on climate change." and showed that the 78% of students have adequate information about climate change from social media.

The current study results reported that 29% of studied students source their information about climate change from mass media, this study results in the same line with **Abdel Nabi et al. (2023)** in Egypt (n=200), who reported that 40% of the studied nursing students knowledge about climate change from mass media. Also, the study result agreed with **Hase et al. (2021)** in Australia, Canada, Germany, New Zealand, the United Kingdom (UK), and the United States (USA) (representing the Global North) and India, Namibia, South Africa, and Thailand (representing the Global South) (n = 71,674), who study entitled "Climate change in news media across the globe: An automated analysis of issue attention and themes in climate change coverage in 10 countries (2006–2018)." and showed that 45% of the study countries gained information about climate change from mass media. Also, these finding disagreed with **Prasad & Mkumbachi, (2021)** in the South Pacific (n=32), who study entitled "University students' perceptions of climate change: the case study of the University of the South Pacific-Fiji Islands." and reported that 75% of students' information was the mass media is the most common principal source about climate change.

Part (II) The studied students' knowledge about climate change

As regards knowledge about climate change, the current study illustrated that about knowledge of the studied students about climate change, and finds that more than 42% of the studied student know correctly meaning of climate change **(table 2),** this study results in the same line with **Abdel Nabi et al. (2023)** in Egypt (n=200), who reported that 42% of nursing students had complete correct knowledge regarding meaning of climate change. This study result disagreed with **De Pascale, (2023)** in Italia (n= 84,983), who study entitled "Geographical education and climate change perception in secondary school: A case study in southern Italy." and showed that during pretest 64% of the studied students have in accurate meaning of climate change.

The current study revealed that 45% of the studied student have incorrect or don't know answer regarding the dangers of global warming. This study results similarly to **Munguia et al. (2023)** in Mexico (n = 1097), who study entitled "Global warming in the minds of Mexican higher education students: an exploratory study." and found that 51% of the studied student had don't know risks regarding the dangers of global warming. This study results not similarly to **Schauss & Sprenger, (2021)** in Germany (n =18), who study entitled "Students' conceptions of uncertainties in the context of climate change." and illustrated that 78% have correct answer about the risks of global warming.

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According to total knowledge level about climate change, the current study results reported that 61% of the studied students had average total of knowledge about climate change **(figure 3).** These findings consistent with **Ibrahim et al. (2018)** in Egypt (n=1300), who study entitled "Knowledge and attitude regarding global warming phenomenon among Assiut University Students." and they found that 49% of the Assiut University Students had average level of knowledge about global warming. And these study result disagreed with **Ali et al. (2024)** who study entitled "Knowledge and Reported Practices of Nursing Students Regarding Health Effects of Climate Change." in Sohag City, Egypt (n=286) and showed that 82.5% of the nursing students had a poor score of knowledge about climate change.

Also, the present study results reported that 33% of the studied students had poor level of knowledge about climate change. This finding agreed with **Hassan, (2023)** in Egypt (n=150), who studied "Climate Change and its Relation to Environmental Sustainability Practice as Perceived by Staff Nurses." and disclosed that 70.7% of the nursing staff had a poor level of knowledge related to climate change. Also, these study result agreed with **Ali et al. (2024)** In Egypt (n=286), who reported that 82.5% of the nursing students had a poor score of knowledge about climate change. From the investigator point of view, these results might be because the curriculum does not include adequate information about climate change in secondary courses concisely and comprehensively. Additionally, the lack of sustainability priority in the national policy of the whole country has an impact.

On the other hand, these findings contradicted with **Rahman et al. (2021)** who conducted a study about "climate change and dengue fever knowledge, attitudes, and practices." in Bangladesh (n=1500) and **Kolenatý et al. (2022)** in Czech Republic (n = 123), who carried out a study titled "What triggers climate action: The impact of a climate change education program on students' climate literacy and their willingness to act" and they illustrated that 77% of students reported good climate change knowledge scores. From the investigator point of view, the variation in results, this may be due to sample size differences.

Part (III) The studied students' attitudes toward climate change

The present study findings demonstrated that 90% of the studied students are agreed with climate change is a global phenomenon, climate change affects human health, studying climate change is necessary because it affects the environment and climate change has led to an increase in natural disasters **(table 3).** These study results agreed with **Deshiana et al. (2022)** in south Sumatra, Indonesia (n= 611), who study entitled "High School Students Awareness and Attitudes toward Climate Change." and illustrated that the 87% of the high school students positive attitudes toward climate change as most students believe that climate change is hazardous and affect human health, climate change threatens mankind and nature, climate change is a real threat that should be treated seriously, and Climate change is having a positive and negative effect on the world.

These study finding inconsistent with **Moshood et al. (2024)** Who study entitled "Knowledge, Awareness, and Perceptions of Climate Change among Forestry Students." in Nigeria (n= 293) and reported that 87% of students having unsatisfactory believe about climate change is a global phenomenon, climate change studying is necessary, and climate change increase natural disasters.

While, the current study revealed that 92% of the studied students are disagreed with climate change is not a reality. This study results agreed with **Petrescu-Mag et al. (2022)** in Romania (n=29), who study entitled "How climate change science is reflected in people's minds. A cross-country study on people's perceptions of climate change." and showed that 29% of the nursing students disagreed with climate change is natural disasters. This study results disagreed with **Kalogirou et al. (2020)** in Canada (n = 22), who study entitled "Nurses' perspectives on climate change, health and nursing practice." And illustrated that 89% nurses accepted for climate change is a natural phenomenon and its affects human health.

As regards **total attitudes level regarding climate change,** the current study illustrated that 79% of the studied students have a positive attitude level regarding climate change**(figure 4),** This result was accordance with **Kolenatý et al. (2022)** in Czech Republic (n = 123), who found that the participants' attitude toward climate change more significantly, and the p-value was (24,00). Also, this result was agreed with **Abdel Nabi et al. (2023)** in Egypt (n=200), who indicated that, 39% of studied nursing students had a positive attitude toward climate change. From the investigator point of views, the attitudes of the student are `AQ greatly affected by what he studies and what he receives of information and knowledge regarding the issue of climate change, especially as it is a very important topic and is considered the talk of the hour these days and also affects people's lives on a daily basis.

While, the study result revealed that 21% of the studied students have a negative attitude levels toward climate change. This result consistent with **Ratinen, (2021)** in Finland (n=950), who study entitled "Students' knowledge of

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climate change, mitigation and adaptation in the context of constructive hope." and reported that 19% of students have a negative attitude levels regarding climate change. This result inconsistent with **Abdel Nabi et al. (2023)** in Egypt (n=200), who conducted that 63% of them had a negative attitude toward climate change. From the investigator point of view, these results may be due to students' low level of knowledge about climate change and their lack of awareness of how to modify their beliefs and practices to prevent or reduce its impact.

Part (IV) correlation between the studied variables:

Regarding Correlation between the studied students' total knowledge and attitude levels toward climate change, the current study showed that there is highly positive statistically correlation between total knowledge levels and attitude levels toward climate change at p- value <0.01**(table 4).** This study result agreed with **Ghazy & Fathy, (2023)** in Egypt (n=425), who study entitled "Effect of awareness program regarding Climate Change on Knowledge, attitudes and practices of University students." and demonstrated that highly statistically correlation between knowledge level and attitude level about climate change. And this study result disagreed with **Eladham et al. (2025)** in Egypt (n=200), who study entitled "Effect of a Climate Change Educational Program on University Students' Knowledge, Attitudes, and Practices." and demonstrated that (pre intervention) there were negatively correlation between total knowledge levels and total attitude levels toward climate change.

Conclusion:

Based on the finding of the present study and answered research questions and it concluded that more than three fifths of the studied students had average total level of knowledge about climate change, and slightly less than one third of the studied students had poor total level of knowledge about climate change. And more than three quarters of the studied students had a positive total attitude level toward climate change.

Also, there were highly statistically significant relation between total knowledge levels and the students' age and number of rooms in house, and there was highly statistically significant relation between total attitude level and the students' gender. There was statistically significant relation between total attitude levels and the students' fathers' level of education. As well; there is highly statistically positive correlation between total knowledge levels and attitude levels toward climate change.

Recommendations:

Based on the findings of the study, the following recommendations were suggested:

1- Increase awareness campaigns among secondary school students about the health consequences of climate change in Sohag.
2- The mass media should be utilized and community organizations mobilized to disseminate knowledge and attitude regarding climate change.
3- Educational program should be performed to secondary school students regarding climate change.

For further research:

1. Further researches in the field of climate change should be done in other setting and on large sample.

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